REMARKS

The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Claims 1-42 are pending in this case. Claims 1-20 have been withdrawn as drawn to a non-elected species. Claims 21, 31, 41-44 are objected to. Claims 21-44 have been rejected under 35 U.S.C. § 103(a).

With respect to the Examiner's 35 U.S.C. § 103(a) rejections, Applicant has reviewed the cited art and respectfully submits that the art fails to disclose or suggest the Applicant's claimed invention. Therefore, Applicant respectfully traverses and requests favorable reconsideration.

Response to 35 U.S.C. § 103(a) Rejections

The Examiner rejected claims 21-44 under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art in view of U.S. Patent No. 6,701,085 ("Muller").

Muller teaches a method for data transmission in a bi-directional working channel between a plurality of terminals of an optical ring network having a protection means that, given a disturbed data transmission, sets up a protection connection in the wavelength-division multiplex method in a working channel via the undisturbed section of the ring network in a single bi-directional protection channel that has at least the transmission capacity of the working channel.

While continuing to traverse the Examiner's rejections, Applicant, in order to expedite the prosecution, has chosen to clarify and emphasize the crucial distinctions between the present invention and the devices of the patents cited by the Examiner. Specifically, claim 21 has been amended to include an apparatus for providing Media Access Control (MAC) based transmission in a Wavelength Division Multiplexing (WDM) optical network comprising a first optical add/drop multiplexer (OADM) comprising a first add module and a first drop module, wherein the first drop module is adapted to receive a first ingress multi-wavelength input transmitted over a first fiber ring and to drop a first channel therefrom, and wherein the first add module is adapted to receive over a **single optical fiber** a multi-wavelength output of a second drop module and to add a second channel thereto to generate a second egress multi-wavelength output for transmission over a second fiber ring, a second wavelength based

multiplexing/demultiplexing device comprising a second add module and a second drop module, wherein the second add module is adapted to receive over a **single optical fiber** the multi-wavelength output of the first drop module and to add a fourth channel to the thereto to generate a first egress multi-wavelength output transmitted over the first fiber ring, and wherein the second drop module is adapted to receive a second ingress multi-wavelength input transmitted over the second fiber ring and to drop a third channel therefrom, a first MAC module comprising a first transmitter and a first receiver, wherein the first transmitter is adapted to provide the second channel added by the second add module and wherein the first receiver is adapted to receive the first channel dropped by the first drop module such that the first MAC transmits and receives data on the same segment of the first fiber ring and the second fiber ring and a second MAC module comprising a second transmitter and a second receiver, wherein the second transmitter is adapted to provide the fourth channel added by the second add module and wherein the second receiver is adapted to receive the third channel dropped by the second drop module such that the second MAC transmits and receives data on the same segment of the first fiber ring and the second fiber ring.

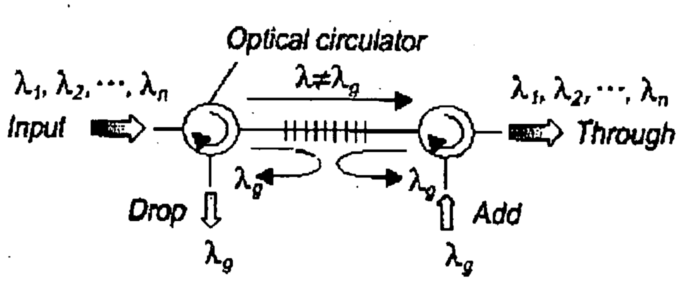
The present invention teaches a novel method of configuring, deploying and connecting OADMs and MACs within each node so as to enable true direct MAC to MAC communications. Direct MAC to MAC communications is defined as communication between two MAC units wherein the Tx of one MAC communicates with the Rx of the other MAC and vice versa, regardless of any intermediary nodes. This is achieved in the present invention by deploying the drop and add modules of each OADM **across** the two optical rings rather than in line with the ring, combined with providing MAC units and connecting them to the OADMs such that the Rx and Tx of each MAC is connected to and add and drop module not located on the same ring. In other words, the Rx of a MAC is coupled to the drop module situated on one ring while the Tx of that MAC is coupled to the add module of a drop module located on the ring traveling in the opposite direction. This feature is neither taught nor suggested by the references cited by the Examiner. Note that the 'packaging' of the drop and add modules is not critical to the invention, meaning whether the drop and add modules are packaged inline with each ring (as shown in Figure 3) or across rings (as shown in Figure 4). In either case, the Tx and Rx of each MAC is connected to drop and add modules situated **across** the rings and not inline with the ring as taught by the prior art.

It is submitted that although Muller teaches a WDM method of data transmission, as shown in Figure 3, it fails to teach the deployment and configuration of OADMs and MACs as taught by the present invention. Muller teaches a protection scheme for a SONET based WDM optical transmission network that uses line/trunk modules and an ADM. The scheme of Muller teaches providing both working lines and protection lines. In the event of a failure on the working line, the fault is detected and traffic is switched to the protection lines.

In contrast, the present invention is a scheme for providing direct MAC to MAC communications in an optical WDM network. It is submitted that the line/trunk modules of Muller are substantially **different** in functionality and operation from the Tx and Rx of a MAC. Further, the ADM at the core of Muller is essentially a pass through device as is widely deployed in SONET networks and is substantially **different** in functionality and operation from the Ethernet switch of the present invention.

It is further submitted that the demux and mux protection scheme as taught by Muller is **not** the same and in fact is substantially different than the OADM based scheme taught by the present invention. Applicants submit that back to back demux and muxes are **not** the same, either functionally or operationally, as an OADM. The key difference between the two is the operation of the drop and add modules within the OADM. These add/drop functions are **not** simple demux and mux operations.

A conventional OADM is constructed using 3-port circulators and a fiber Bragg grating (FBG). A fiber Bragg grating is a permanent periodic modulation of the refractive index along a given length of an optical waveguide. It is formed by utilizing the photosensitivity of germanium-doped silica glass. The typical construction of an OADM includes a first 3-port optical circulator coupled to the FBG which is tuned to a particular wavelength. The FBG is further coupled to a second 3-port optical circulator. In the figure below, the FBG is shown schematically by the short vertical lines between the two circulators.



In operation, a multi-wavelength input signal is input to the first circulator. The OADM is operative to drop one particular wavelength λ_g and to pass all other wavelengths through to the second circulator. This is due to the operation of the FBG, which is tuned to wavelength λ_g. The second circulator is used to add a wavelength to the multi-wavelength signal input to the second circulator. The output of the second circulator comprises the output of the OADM and includes all *n* wavelengths within the single output fiber.

Thus, with reference to Figure 4 of the present invention, a single optical fiber couples the drop module 124 and add module 142. Likewise, a single optical fiber couples drop module 144 to add module 126. This is in line with the construction of OADMs as described above.

Muller, on the other hand, does not teach the use of OADMs. Rather, Muller teaches the use of back to back demultiplexers and multiplexers. In Muller, the multi-wavelength input is immediately split into individual wavelengths. Thus, each wavelength is carried over a **separate individual optical fiber**. Only a **single** wavelength travels on each optical fiber. The 'dropping' of a wavelength is performed by a hard termination at a line/trunk card. No other wavelengths are carried by the optical fibers other than the particular wavelength corresponding to the output of the demux the optical fiber is coupled to. Thus, the protection scheme of Muller does not teach the use of a single optical fiber for dropping and adding wavelengths.

In contrast, the direct MAC to MAC communication scheme of the present invention uses a single optical fiber to couple the drop and add modules in the OADMs. The wavelength to be dropped or added is determined by the FBG device within the OADM as described hereinabove.

It is further submitted that the OADMs of the present invention coupled to a particular MAC are not limited to one particular frequency. In other words, with reference to Figure 4, the drop module 124 of OADM 122 may be set to drop a first wavelength while the add module 126 within that OADM may be configured to add a second wavelength. Since the wavelengths are determined by the drop and add modules, the present invention does not limit the use of one wavelength for both drop and add functions to a particular MAC. Thus, the signal from ring 128 input to the Rx 164 of MAC 160 may be received from a signal having a first wavelength while the signal transmitted from the Tx 162 of the same MAC 160 may be transmitted over the ring 138 using a second wavelength. This feature is neither taught nor suggested by Muller.

The scheme of Muller is limited to the use of the same wavelength for transmission and reception from any one of the line/trunk cards.

Applicant respectfully submits that the Examiner has failed to show that one of ordinary skill in the art would have been motivated to modify the admitted prior art in view of Muller to arrive at the claimed invention because there is no suggestion made by the admitted prior art or Muller to configure the drop and add modules of OADMs to provide direct MAC to MAC based communication in a WDM optical ring network.

Applicant submits that Examiner has not made a *prima facie* case of obviousness. The teaching or suggestion to make the claimed combination must be found in the prior art, not in Applicant's disclosure (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Applicant therefore submits that independent claims 21, 31, 41-44 are allowable and requests favorable reconsideration. Because admitted prior art and Muller do not anticipate or suggest claims 21, 31, 41-44 as discussed above, then claims 22-30, 32-40 are allowable as well. The Examiner is respectfully requested to withdraw the rejection based on § 103(a).

Conclusion

In view of the above amendments and remarks, it is respectfully submitted that independent claims 21, 31, 41-44 and hence dependent claims 22-30, 32-40 are now in condition for allowance. Prompt notice of allowance is respectfully solicited.

In light of the Amendments and the arguments set forth above, Applicant earnestly believes that they are entitled to a letters patent, and respectively solicit the Examiner to expedite prosecution of this patent applications to issuance. Should the Examiner have any questions, the Examiner is encouraged to telephone the undersigned.

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Respectfully submitted,
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